

Implementing a MIRC Interface for a Database Driven Teaching File

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ABSTRACT:

This poster describes the feasibility of integrating an existing database driven teaching file with the Radiological Society of North America's (RSNA) Medical Imaging Resource Center (MIRC). MIRC is the product of an RSNA sponsored initiative to enable medical institutions to share their electronic medical content (images, text, and multimedia) by creating a distributed repository accessible from the Internet. A description of MIRC's query/storage service architecture is provided along with an overview of the author's experience with implementing a storage service front end for an existing, database driven teaching file system.

BACKGROUND:

The MIRC community consists of independent sites located at institutions worldwide. Each site can act as either a "storage service" by hosting the medical content to be shared, as a "query service" by providing a user interface for performing a broadcast query of the storage services selected by the user, or as both a query and storage service. Technical documentation on MIRC can be found on the RSNA MIRC site at: <http://mirc.rsna.org/>

Providing a storage service interface for a database driven teaching file system involves building a software layer called a query interface, on top of an existing site, to communicate with the query service. Communication between query and storage services takes place via HTTP through the exchange of two XML documents. The query service sends the storage service a "MIRCquery" XML document, to which the storage service responds with a "MIRCqueryresult" document. The MIRCquery document contains the query parameters specified by the user and includes such search criteria as keywords, age, gender, image format, etc. The MIRCqueryresult document contains descriptors, such as title, abstract, and URL, for the content matching the specified search criteria. The query service presents the search results as a list containing links pointing directly to the content on the storage service.

In addition to managing the exchange of XML documents between the query and storage services, the interface is responsible for mapping the elements and attributes of the MIRCquery and MIRCqueryresult documents to the appropriate tables and

columns in the database. Part of the mapping process also involves translating the Boolean query syntax used by the query service into the database engine's internal query language. Optionally the query interface can also implement a mechanism for caching search results to permit the selective transmission of results to the query service.

MATERIALS AND METHODS:

The teaching file presented here contains several thousand cases created over four years. The underlying database engine is 4th Dimension (4D) which contains a built in web server used to provide access to the teaching file from the Internet. 4D contains an extensive scripting language that permits developers to create complete applications around the database engine. In addition 4D supports the use of "plug-ins," software packages created by third-party developers, which extend the capabilities of the scripting language. Since 4D lacks built-in XML processing capabilities the "Expat4D" plug-in was used. Expat4D is a free plug-in based on the open source, event driven, XML parser "Expat".

DISCUSSION:

An initial implementation of the interface required only three days of development time, with refinements taking place over several months. MIRC's reliance on HTTP and XML, two widely accepted standards, greatly reduced development time by allowing the author to use existing software components when building the network piece of the interface. Mapping of the MIRC XML documents to the storage service's database schema was straightforward since both shared most of the same data definitions. A majority of the development effort was spent on mapping MIRC's query syntax to the database engine's internal query language.

CONCLUSION:

This project has demonstrated the feasibility of implementing a MIRC interface on an existing teaching file server. MIRC's use of XML and HTTP allows a developer to leverage existing software tools when building a MIRC query interface, thereby lowering the barrier to entry into MIRC. This should permit a multitude of sites with a variety of content to participate in MIRC, thus increasing the value of MIRC to the radiology community.